Medical–Biological
Research & Technologies

Inteliwasher

3D-IW8

Microplate washer

Operating Manual
Certificate

for version
V.2AW

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1. Safety precautions

Attention! Please make sure you have fully read and understood the Manual before using the equipment and pay special attention to sections marked by this symbol.

Note: Paragraphs marked with this symbol contain information about important functions and use of the device.

GENERAL SAFETY PRECAUTIONS

- Use only as specified in the Operating Manual provided.
- Protect the unit from shocks and falling.
- After transportation or storage, keep the unit at room temperature for 2-3 hours before connecting to the mains.
- Use only cleaning and decontamination methods recommended by the manufacturer.
- Do not make modifications to the design of the unit.
- Before diagnostics, study carefully the possibilities and operation procedures of the unit in order to obtain reproducible and credible results. Check any unclear issues with the supplier.
- It is not recommended to leave the operating unit unattended for a long period.
- Change the bottles or connecting tubes only when the unit is switched off.
- In case of doubt about the quality and uniformity of the completed washing program, disregard the results obtained and repeat the washing procedure.
- Accuracy of the obtained testing results depends on the quality of the microplate rinsing procedure. To assure correctness of the rinsing procedure, regularly exercise visual control over reproducibility of liquid volume dosing.

ELECTRICAL SAFETY

- Connect only to an external power supply unit with voltage corresponding to that on the serial number label. Use only the external power supply unit provided with this product.
- Do not plug the power supply unit into an ungrounded power socket, and do not use an ungrounded extension lead.
- Ensure that the switch and external power supply connector are easily accessible during use.
- Disconnect the unit from the mains before relocating it.
- If liquid penetrates into the unit, disconnect it from the mains and do not use it until it is checked by a repair and maintenance technician.
- Do not operate the unit in premises where condensation can form. Operating conditions of the unit are defined in the Specifications section.

DURING OPERATION

- Do not operate the unit in environments with aggressive or explosive chemical mixtures. Please contact manufacturer for possible operation of the unit in specific atmospheres.
- Do not operate the unit if it is faulty.
- Always have the cover protecting against aerosol spread (hereinafter protective cover) installed during operation.
- Do not operate the unit if any needle is clogged or malfunctions.
- Never touch the needles or place fingers or other parts under the needles during operation. Manifold needles are sharp and can cause injury.
- Always switch off the unit before changing the manifold.
- Do not allow the waste bottle to overflow the maximum level during operation (there is a mark on the side surface of the bottle). Take necessary precautions utilizing waste liquid in accordance with general laboratory standards.

AFTER OPERATION

- Carry out the cycle of system washing (on the unit front panel, use the button **System rinsing**) with distilled water and do not dry. This will keep the system in permanent operation condition.

BIOLOGICAL SAFETY

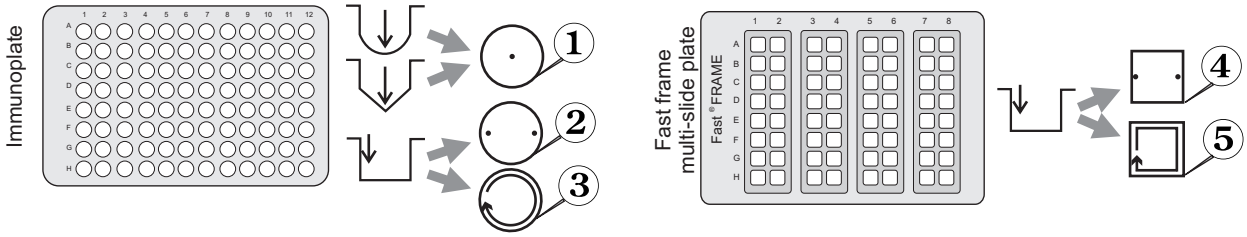
- It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or penetrates into the equipment.
- In diagnostic researches, potentially dangerous biological materials can be used. When working with such materials, always use protective clothing and eye protection. Always have the protective cover installed during operation.

2. General information

Inteliwasher 3D-IW8 series microplate washer is designed for washing various types of standard microtitre plates, microstrips and microarrays on FastFRAME (rectangular well shape). It is suitable for washing wells with different bottom shapes: flat, U-shape and V-shape. The unit is fully programmable ensuring multi-step solution ripening, aspiration (aspiration, combination of aspiration/liquid dispensing and soaking, as well as soaking cycle during a particular period of time).

The unit has 50 programs divided into 5 following aspiration categories (see scheme1 below):

1. Type 1 (1.0 – 1.9) IPF96 U/V is intended for U-shape and V-shape immunoplates, 1 point aspiration.
2. Type 2 (2.0 – 2.9) IPF96 FLAT-2 is intended for flat-bottom shape immunoplates, 2 point aspiration.
3. Type 3 (3.0 – 3.9) IPF96 FLAT-C is intended for rectangular shape immunoplates, full-circle aspiration direction.
4. Type 4 (4.0 – 4.9) FastFRAME-2 is intended for multi-slide* plate with rectangular wells.
5. Type 5 (5.0 – 5.9) FastFRAME-C is intended for multi-slide* plate with rectangular wells.



Scheme 1

* – The FastFRAME (Schleicher&Shuell) multi-slide plate or analog plate of another manufacturer, that is compatible with standard 1 x 3 inch (25 x 76 mm) glass slides.

NOTE: Optional 4-channel washing solution weight logger, 4CHW Logger allows automatic buffer bottles and waste bottle volume control.

The unit is supplied with 8-channel washing head for dispensing/aspiration, 3 bottles for washing and rinsing solutions, a waste bottle and small bottle with hydrophobic filter that eliminates risk of contamination with bacteria, viruses and infected particle from wasted liquid to an atmosphere. Hydrophobic filter bacterial efficiencies is very high, up to 99.999% particles bigger than 0.027 micron (which is smaller than Hepatitis A, B and C).

The unit provides:

- washing mode;
- rinsing mode;
- mixing mode;
- single point, two point, circular (circle or rectangular path);
- possibility of additional solution mixing during time gap between two work cycles;
- possibility to use microtest plates by different manufacturers, ensured by automated plate set up (adjusting to different depths of plate wells);
- round-bottom plate and strip washing mode;
- possibility of user-defined programs with adjustable parameters.

3. Getting started

3.1 Unpacking.

Remove packaging materials carefully and retain them for future shipment or storage of the unit.

Note: Examine the unit carefully for any damage incurred during transit. The warranty does not cover in-transit damage.

3.2 Complete set. The set includes:

No. in Fig.1	Name	Quantity
1	Inteliwasher 3D-IW8 microplate washer	1 piece
2	Platform for plates	1 piece
3	Manifold	1 piece
4	Protecting cover	1 piece
5	External power supply unit	1 piece
6	Tubes (outside/inside diam./length 6/3/600 mm)	5 pieces
7	Tube for manifold (outside/inside diam./length 3.2/1.6/400 mm)	1 piece
8	Tube for manifold (outside/inside diam./length 5/3/440 mm)	1 piece
9	Tube for hydrophobic filter (outside/inside diam. 9/6 mm)	1 piece
10	Half-litre bottle with connectors for aerosol collection	1 piece
11	1-litre bottles with sieve filters and connectors for reagents	3 pieces
12	2-litre bottle with connector for collecting of waste liquid	1 piece
13	Hydrophobic filters for half-litre bottle	2 pieces
14	Manifold cleaning set	1 piece
15	Syringe for liquid flushing in hoses	1 piece
16	Power cord	1 piece
17	Operating manual, certificate	1 copy
18	4-channel washing solution weight logger, 4CHW Logger	on request

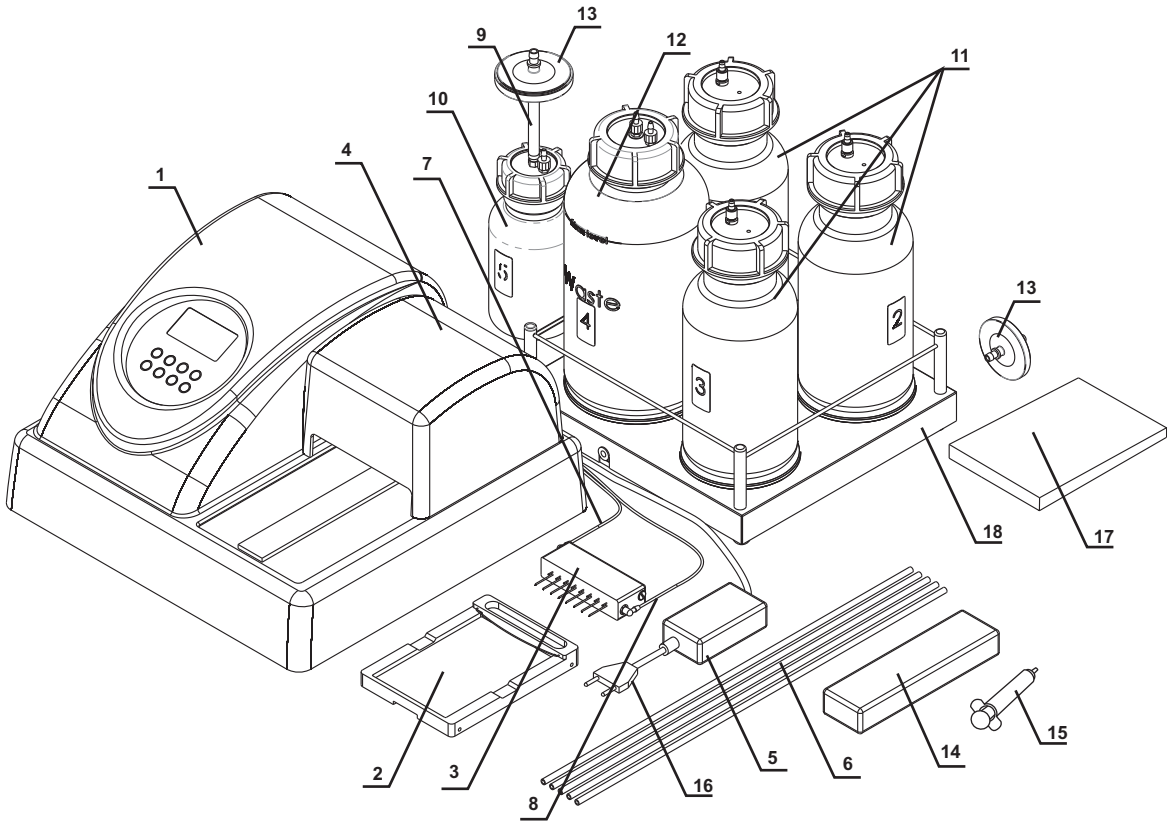


Fig. 1. Delivery set

3.3. Storage and transportation

During long-term storage, it is recommended to keep the unit and all its accessories in original packaging in a dry place protected from dust.

Note: Remove the washing solution completely from the hydraulic system in case of long-term storage (more than 8 hrs).

Use the original packaging for transportation whether transported by air, water or land.

Attention! We do not accept warranty claims related to damages caused by improper packaging.

To pack the unit properly:

3.3.1. Remove the manifold, tubes and platform for plates.

3.3.2. Put on packaging blocks onto sides of the unit and place it into the original carton box.

3.3.3. Place the manifold into the protecting case, the syringe, the manifold cleaning set and the platform into the polythene bag. Place the bag, the case with the manifold in the corners of the box between the packaging blocks and the side panels of the carton box, place the 2-litre bottle and the half-litre bottle in free space, between the packaging blocks and the side panels of the carton box.

3.3.4. Insert the top section into the carton box, previously bending it downwards along the perimeter and insert the deflected parts between the walls of the original carton box and packaging blocks, so that the device and the rest content of the lower part of the box are fully covered.

3.3.5. Put the soft foam sheet (of grey colour) with the smooth side downwards on the resulting horizontal carton surface.

3.3.6. Put the rest three bottles and other accessories on the foam sheet.

Note: If 4-channel weight logger is included in the kit, place pads under scale cups, then place the logger into top section of packaging.

3.3.7. Cover all the content with another sheet of soft foam material with the smooth side upwards.

3.3.6. Close the box and seal with duct tape.

3.4. Unit on-site installation and preparing for operation

3.4.1. Place the unit on a strong horizontal surface, which can safely support weight of the unit. To provide optimal ventilation, ensure 100 mm clearance on each side. Operate at ambient temperature from +4° to +40°C and relative humidity up to 80% at +25°C.

3.4.2. Remove the protecting cover.

3.4.2. Unpack the plate platform.

3.4.3. Place the plate platform on the rail (fig. 2/1) so that the plate holder (flat spring) faces the rear side of the unit (fig. 2/2). Magnet on the other side of the rail will move the platform into start position.

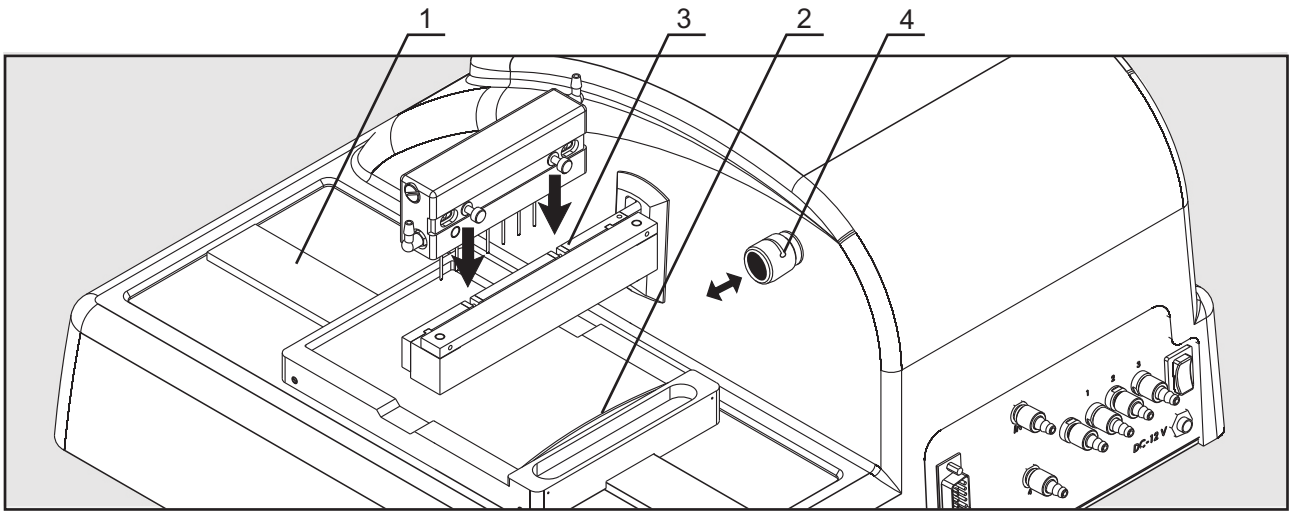


Fig. 2. Installation of platform and manifold

Note: If the plate platform is installed improperly, the magnet will not hold it in place and the platform will be able to move freely. Move the platform along the rail until the magnets lock. Increase of resistance to movement indicates that the magnets are locked.

3.4.5. Unpack the manifold.

3.4.6. Place the manifold on the holder arm so that the guide pins of the manifold slide into the respective grooves of the holder arm (fig. 2/3).

3.4.7. Connect the manifold inlet connector supplying the liquid and the **Washing Head Dispense** (**blue**) connector at the rear panel of the unit (fig. 3/2) with the tube (fig.1/7).

3.4.8. Connect the manifold outlet connector and the **Washing Head Aspirate** (**yellow**) connector at the rear panel of the unit (fig. 3/4) with the tube (fig.1/8).

Note: Use the provided labels for marking bottles with washing solutions and bottles for collecting waste liquid and aerosol.

3.4.9. Connect the **Waste bottle outlet** (4 – **green**) on the rear side of the unit to the connector of 2-litre bottle (number 4) for collecting of waste liquid (fig. 3/1).

3.4.10. Place the tube for the hydrophobic filter (fig.1/9) on the half-litre bottle (number 5) connector, then place the hydrophobic filter on the tube (fig.1/13). When installing the filter, its "IN" marking must be facing the bottle 5 (fig. 11).

3.4.11. Connect the Waste bottle to the half-litre bottle (number 5) (fig.3/10).

On the rear side of the unit:

3.4.12. Connect bottle with buffer 1 to the inlet connector [1 – **red**] on the rear side (fig. 3/3) with the tube (fig.1/6).

3.4.13. Connect bottle with buffer 2 to the inlet connector [2 – **black**] (fig. 3/5) with the tube (fig.1/6).

3.4.14. Connect bottle with buffer 3 to the inlet connector [3 – **white**] (fig. 3/6) with the tube (fig.1/6).

3.4.15. Insert the manifold tube (fig. 3/2) into the valve opening (fig. 2/4). Press the valve in the direction of the arrow and hold the valve while stretching the tube and pulling it through the opening. Release the valve.

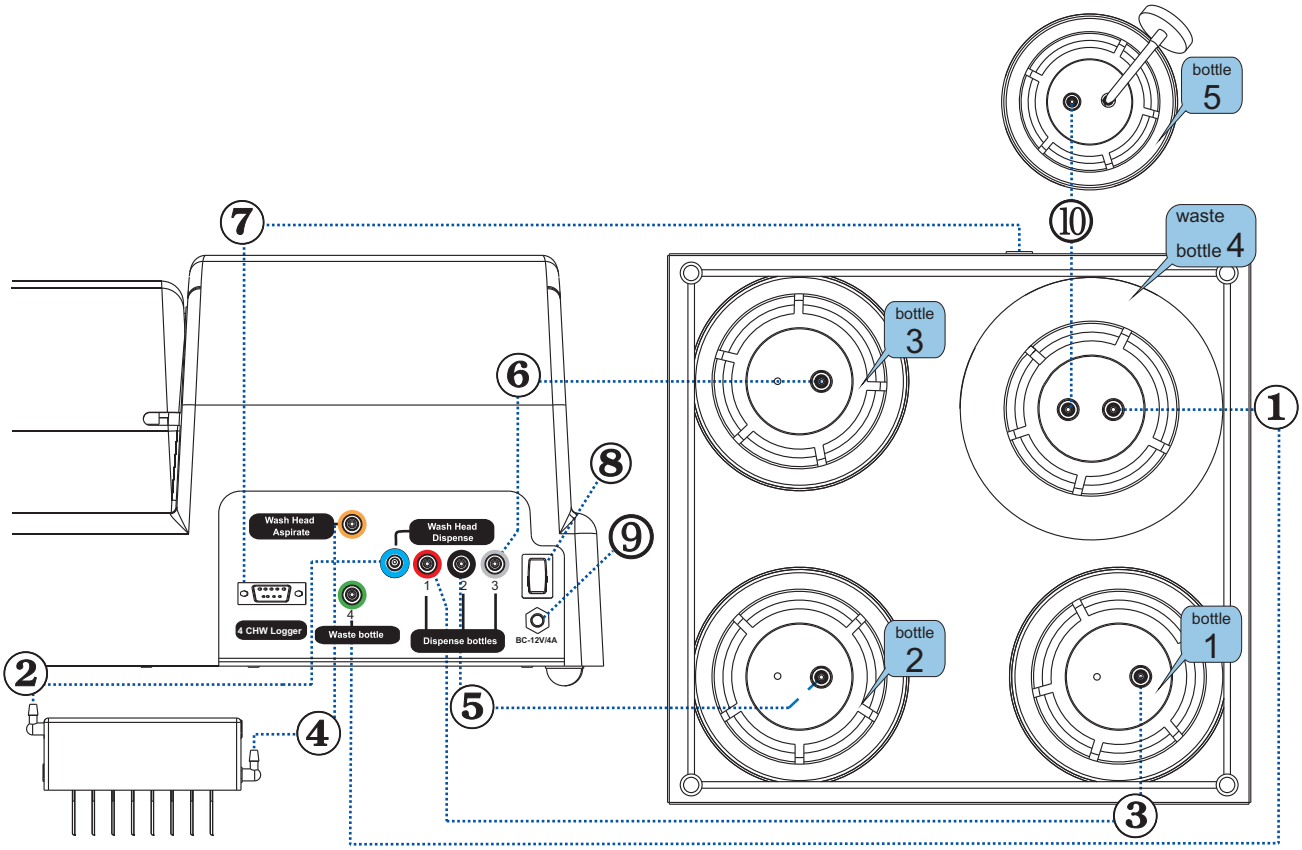


Fig. 3. Assembly diagram

Note: Make sure that all connections are secured tightly.

3.4.16. Install the protective cover ensuring all tubes are covered, but not squeezed.

3.4.17. Place bottles near the unit.

Note: If 4-channel weight logger is included in the kit, remove pads from underside of scale cups.

3.4.18. Place bottles on the 4-channel weight logger according to the numbering.

3.4.19. Connect the **RS-232** with the cable to the plug connector on the rear side of the unit (fig. 3/7).

Attention! Make sure that the power switch of the unit is in O (Off) position before connecting power cable to the mains outlet.

3.5. Switching on

3.5.1. Connect the external power supply to the power socket (fig.3/8) on the rear panel of the unit.

3.5.2. Connect the power cord to the external power supply unit (fig.1/16)

3.5.3. Connect the external power supply unit to the grounded power socket.

3.5.4. Switch ON the unit (position **I**) using the power switch on the rear panel.

3.5.5. When switched on, the unit performs full initialisation cycle and displays the message "Power on reset"

Note: Full initialisation cycle takes not longer than 5 seconds.

4. Operation

4.1. Before starting plate washing:

Fill the rinsing liquid bottle (number 3) with distilled water or appropriate cleansing solution.

Fill the necessary bottles (number 1 and/or 2) with washing solutions.

4.2 Initial parameters of all programs are given in Table 1. All values are adjustable. Ranges descriptions of program parameters are shown in Table 2. All programs are divided into 5 categories of 10 adjustable programs. Each category corresponds to a different plate well configuration and, subsequently, aspiration mode (fig. 4)

- First category, **IPF96 U/V**, is intended for U-shape and V shape well immunoplates.
- Second category, **IPF96 FLAT-2**, and third category, **IPF96 FLAT-C**, are intended for flat-bottom well immunoplates.
- Fourth category, **FastFRAME-2**, and fifth category, **FastFRAME-C**, are intended for Watman Schleicher & Shuell FastFRAME plates with rectangular wells.

Nr	00	01	02	03	04	05	06	07	08–100
Parameter	**Aspirate**	**1x400_30**	**2x400_30**	**3x400_30**	**5x400_30**	**5+1x400_30**	**Soak 5 min**	**Dispense 200**	**Programmable**
Dispense	NO	YES	YES	YES	YES	YES	YES	YES	YES
Aspirate	YES	YES	YES	YES	YES	YES	YES	YES	YES
Shake	NO	NO	NO	NO	NO	NO	NO	NO	NO
Dispense rate	02	02	02	02	02	02	02	02	03
Aspirate rate	03	03	03	03	03	03	03	03	03
Soaking, s	20	30	30	30	30	30	300	00	00
Shaking, s	-	-	-	-	-	-	-	30	30
Dispensed volume, µl	-	400	400	400	400	400	300	200	300
Aspirate time,ms	1200	600	600	600	600	600	600	-	1000
Final aspirate, ms	-	1200	1200	1200	1200	1200	1200	-	YES
First aspirate	-	YES	YES	YES	YES	YES	NO	-	YES
Wash by rows	-	YES	YES	YES	YES	YES	NO	-	YES
On two channels	-	NO	NO	NO	NO	YES	NO	-	NO
Num.of 1 wash cycles	-	01	02	03	05	05	01	-	03
1 channel	-	01	01	01	01	01	01	01	01
Num.of 2 wash cycles	-	-	-	-	-	01	-	-	-
2 channel	-	-	-	-	-	02	-	-	-

Table 1. Initial parameters of all user programs

4.3. Install the plate on the platform.

Attention! When installing a plate the first time or when a different type of plate is installed perform plate setup to adjust the manifold lowering depth (see paragraph 4.20).

Note: When working with the FastFRAME plates, remove the plate holder (fig. 2/2). Install it back when working with immunoplates.

4.4. Use the **Enter** (fig. 5/1) key to select category, depending on the used plate type. Use the "**+**" and "**-**" keys (fig. 5/3) to select required washing program from 1 to 10. Program category and number are displayed in the top right corner of the display (fig. 4/1)

4.5. Press the **Program Parameters** key (fig. 5/4) to view the parameters of program. In the program, first parameter is selected (Dispense...yes/no, fig. 5/5).

4.6. Press the **Enter** key to select next parameter.

Parameter	Value or range	Description
Despense	yes/no	Perform fill
Aspirate	yes/no	Perform aspiration*
Shake	yes/no	Plate shaking on the platform during the cycle
Dispense rate	01..03	Speed of liquid filling (100; 200; 300 µl/s)
Aspirate rate	01..03	Speed of liquid aspiration
Soak limit, s	0..300 (step 10 s)	Time between fill and aspiration
Shake limit, s	05..150 (step 5 s)	Shaking time
Double aspiration	yes/no	Second aspiration mode
Dispensed volume	25…1600 (step 25)	Volume of dispensed liquid
Aspirate time, ms	200..3000 ms (step 200 ms)	Time of aspiration from well in cycle
Final aspirate, s	200..3000 ms (step 200 ms)	Time of last aspiration in the cycle
First aspirate	yes/no	Aspiration is the first action in a cycle
Wash by rows	yes/no	Each row is washed once per cycle
On two channels	yes/no	Use 2 washing solutions
Num.of wash cycles	1..15	Number of washes with first solution
The channel	1..3	Number of first bottle to use
Second chan. cycles	01..15	Number of washes with second solution
Second channel	01..03	Number of second bottle to use

Table 2. Programs and their definitions

*During aspiration, the waste fluid bottle is detected automatically - 4th bottle. The number of the bottle is not specified on the display.

4.7. Use the "**+**" and "**-**" keys to select necessary value and press the **Enter** key to change the active parameter. Pressing the Enter key automatically saves the setting and activates the next parameter. This way you will be able to review and/or change all parameters.

4.8. Pressing the **Back row** key (fig. 5/6) will return to the previous parameter in the program.

4.9. Press the **Program Parameters** key again to exit parameter view and change mode and save the program.

4.10. Press the **Esc** key (fig. 5/7) to exit parameter view and change mode without saving.

4.11. Use the **Run/Stop** key to start the program.

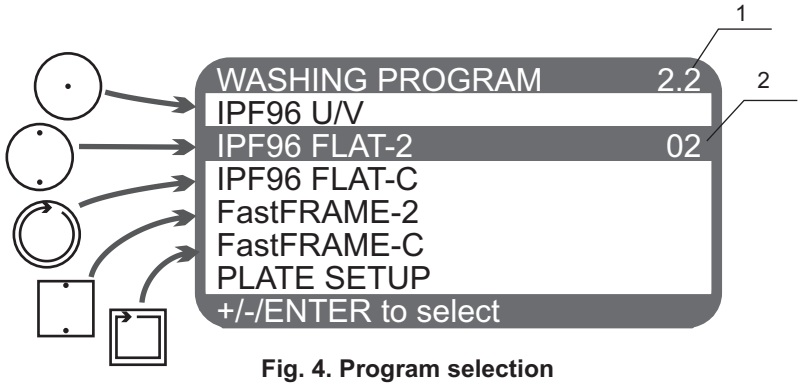


Fig. 4. Program selection

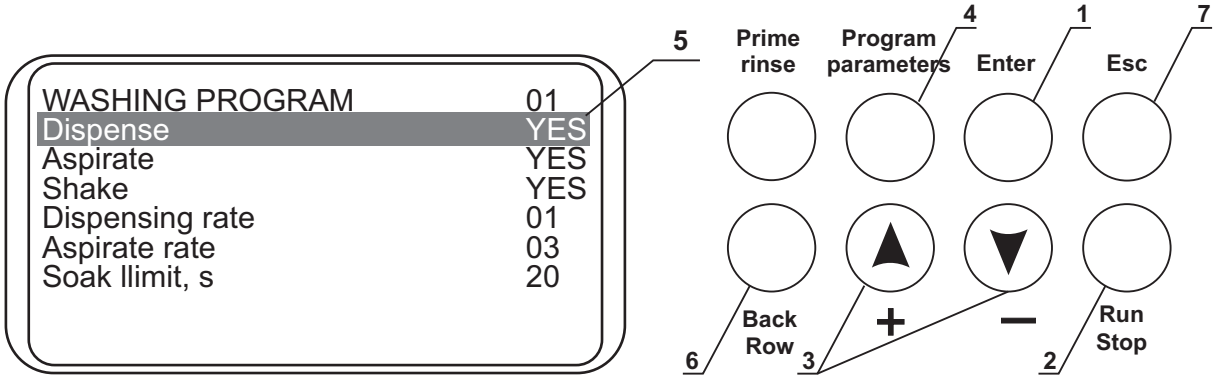


Fig. 5. Control panel

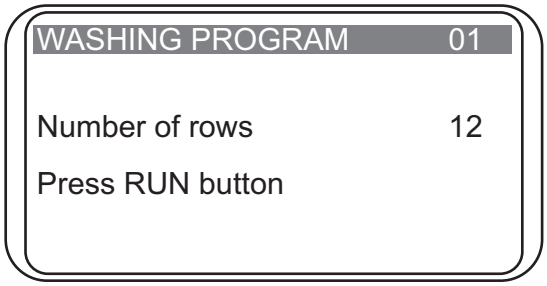


Fig. 6. Pre-set rinsable row number

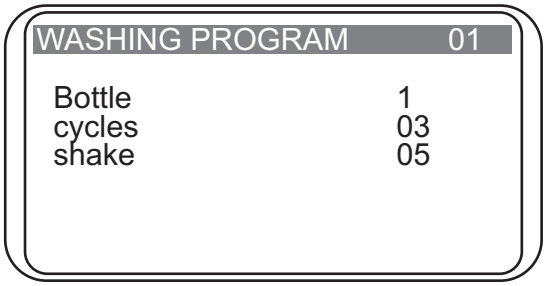


Fig. 7. Operating program messages

4.12. If washing of less than 12 rows on a plate is needed, press the **Rows** key before starting. The following message appears on the display (fig. 6).

4.13. Select necessary number of rinsable rows using "**+**" and "**-**" keys.

4.14. Pressing the **Run/Stop** key will save changes and start the unit operation.

4.15 If operation requires washing from two channels (parameter **On two channels** set to YES), the message (to confirm the correct bottle number of second wash) appears on the display before starting the program (fig. 9).

Select necessary bottle number with buffer using "**+**" and "**-**" keys and press the **Run/Stop** key. It will save changes and start the unit operation.

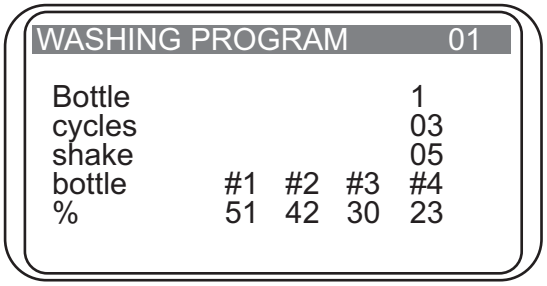


Fig. 8. Operating program messages

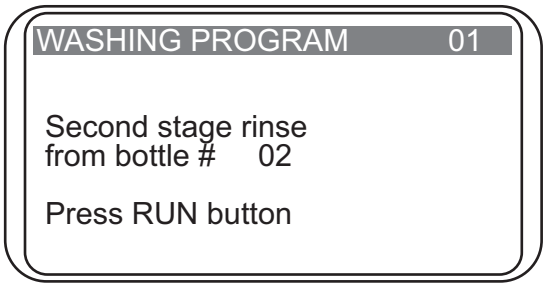


Fig. 9. Operating program messages

4.16. During operation, the number of cycles left is displayed (fig. 7). If the current action has time tracking (soaking, shaking), then the elapsed time is displayed.

4.17. If 4-channel washing solution weight logger is connected to the unit, the display during operation shows following massages (fig. 8): program number, active bottle number, cycles left and the remaining volume percentage of liquid in the bottles. For the waste bottle, filled liquid amount is displayed accordingly based on 2-litre bottle volume percentage.

4.18. Pressing the **Run/Stop** key during operation will stop the program, and the message “Canceled by operator” appears on the lower line of the display. Press the **Run/Stop** key to restart the washing.

Note: If operation requires washing from one channel (parameter **On two channels** set to NO), washing parameters for the second channel are not displayed. Respectively, if two channels are set (parameter On two channels set to YES), washing parameters for the second channel are displayed and can be adjusted as needed (Table 3). Before starting the program for washing from two channels, the message (to confirm the correct bottle number of second wash) appears on the display (fig. 9).

4.19. When the cycle is completed, a sound signal will inform that the unit stopped the operation. Move to paragraph 5 of chapter “Operation closedown” of this manual.

Attention! Always perform the rinsing cycle using distilled water after finishing the operation at the end of working day. This will help to keep the unit in working order and prevent head channel clogging.

4.20. Plate setup

When installing a plate for the first time or when a plate of different type is used, set up the manifold needles lowering depth.

4.20.1. Pressing the **Enter** key in the start mode and navigate to PLATE SETUP using "**+**" and "**-**" keys, the following message appears on the display (fig.9).

4.20.2. To confirm calibration, press the **Run/Stop** key.

The manifold will measure the depth of the plate well by touching the plate surface first and then the bottom of the well. Then it will save the difference of the values measured.

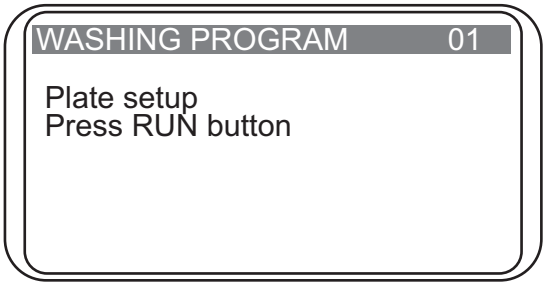


Fig. 9. Manifold lowering depth identification

Despense	**YES**
Aspirate	**YES**
Shake	**YES**
Dispense rate	**03**
Aspirate rate	**03**
Soak limit, s	**00**
Shake limit, s	**30**
Double aspiration	**YES**
Dispensed volume*	**300**
Aspirate time, ms	**1000**
Final aspirate, ms	**2000**
First aspirate	**YES**
Wash by rows	**YES**
On two channels	**YES**
Num.of wash cycles	**03**
The channel	**01**
Second chan. cycles	**01**
Second channel	**02**

Table 3. All parameters of programs with two channels

5. Operation closedown

5.1. When the cycle is completed, a sound signal will inform that the unit stopped the operation.

Attention! Always perform the rinsing cycle using distilled water after finishing the operation at the end of working day. This will help to keep the unit in working order and prevent manifold channel clogging.

5.2. Press **Prime rinse** (fig. 10/1), and the message "PRIME RINSE, the channel 01" will appear.

Select the correct channel using "**+**" and "**-**" (fig. 10/2).

Press **Run/Stop** (fig. 10/3) key and the system will perform rinsing cycle.

Repeat the procedure twice, if necessary.

5.3. Disconnect the tube from selected bottle, and press **Prime rinse** key again to dry the tube with air.

5.4. After finishing the operation, remove the tube from the valve opening to prevent deformation (wall glueing) of the dosing valve tube. To remove the tube, press the valve on the side (fig. 2/4, 2/↕) and stretch the tube a little when pulling it through an opening.

5.5. Switch the unit off using mains switch on the rear panel (position **O**, OFF).

5.6. Unplug the external power supply unit from the mains.

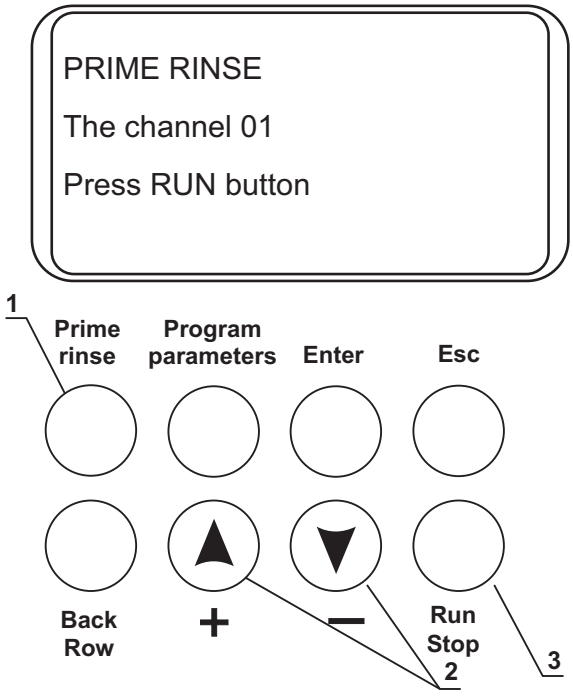


Fig. 10. Prime rinse function

6. Program error messages

Table 4 shows the program cycle error messages, their description and possible solutions.

No.	Displayed message	Description	Troubleshooting
1.	E_TRAIL_HOME ERROR	Initial platform position error	*
2.	E_TRAIL_STEP ERROR	Platform movement error	*
3.	HEAD MOVE DOWN ERROR	Head movement error	*
4.	HEAD MOVE UP ERROR	Head movement error	*
5.	K_RESET ERROR	Error moving valve into initial position	*
6.	K_POSITION ERROR	Error moving valve into set position	*
7.	CANCELED BY OPERATOR	Program execution is stopped by operator	Press Run/Stop key
8.	E_TRAIL_FOR ERROR	Platform movement error	*
9.	E_TRAIL_BACK ERROR	Platform movement error	*
10.	BOTTLE 4 OVERFLOWED	Overflow of waste collection bottle	Empty the waste bottle
11.	BOTTLE EMPTY	Buffer bottle needs to be filled	Fill the bottle
12.	PLATE ERROR	Plate calibration is required	See 4.21 point
13.	HEAD ERROR	Head movement error	*
14.	E_LANDING_ZONE ERROR	Error moving plate into working zone	*
15.	HEAD MODULE IO ERROR	Head movement error	*
16.	E_TRAIL_IO ERROR	Platform movement error	*
17.	PUMP MODULE IO ERROR	Error moving syringe into set position	*
18.	E_RX_TIMEOUT	4CHW Logger error	*
19.	E_RX_ZERO_LEN		
20.	E_RX_BAD_CRC		

Table 4. Program error messages

* Repair only by service engineers and trained specialists.

7. Specifications

The unit is designed for operation in closed laboratory rooms at ambient temperature from +4ºC to +40ºC in a non-condensing atmosphere and maximum relative humidity 80% at 31°C decreasing linearly to 50% relative humidity at 40°C.

- Dispense system of liquid dosage for each channel separately;
- Minimum dispense volume . . . . . 25 µl
- Maximum dispense volume . . . . . 1600 µl
- Dispense increment . . . . . 25 µl
- Irregular liquid dosage at 300 µl. . . . . max. ±2.5% or 7.5 µl
- Allowed residual liquid volume in plate well . . . . . max. 2 µl
- Number of wells washed simultaneously 8
- Number of washing cycles. . . . . 1 – 15
- Aspiration time . . . . . 0.2 – 3 s
- Aspiration/dispensing speed . . . . . 3 levels
- Choice of 3 washing buffers
- Dispense system . . . . . sphincter valve
- Soaking time . . . . . 0 – 300 s (increment is 10 s)
- Number of washed rows . . . . . 1 – 12
- Time of plate single wash (300 µl) . . . . . max. 65 s
- Number of programs 101
- Plate platform and manifold movement . . . . . automated
- Indication of operation modes . . . . . 8-line LCD
- Dimensions . . . . . 375x345x180 mm
- Weight*. . . . . 9.6 kg
- Input current/power consumption . . . . . 12 V, 1.8 A / 22 W
- External power supply unit . . . . . input AC 100–240 V 50/60 Hz, output DC 12 V

Optional accessories	Description	Catalogue number
4CHW Logger	4-channel washing solution weight logger, max. loading per scale cup 2 kg, logger dimensions 267x252x97 mm, weight* 3 kg	BS-060102-AAI

Replacement parts	Description	Catalogue number
Bottle 1	Assembled (with weight, tube, filter)	BS-060102-S26
Bottle 2	Assembled (with weight, tube, filter)	BS-060102-S27
Bottle 3	Assembled (with weight, tube, filter)	BS-060102-S28
Bottle 4	Assembled with tube	BS-060102-S29
Bottle 5	Assembled (with filter, tube)	BS-060102-S43
Hydrophobic filter	For bottle 5	BS-060102-S44
Filter complete set	Filter, weight, tube	BS-060102-S01
Silicone tube set	6 pcs.	BS-060102-S39

* Accurate within ±10%.

Biosan is committed to continuous improvement of the unit's properties and quality and reserves the right to alter unit's design and specifications without additional notice.

8. Maintenance and troubleshooting

8.1. If the unit requires maintenance, disconnect the unit from the mains and contact your local Biosan representative or Biosan service department.

8.2. All maintenance and repair operations must be performed only by qualified and specially trained personnel.

8.3. Do not use non-conforming parts for repair. The manufacturer provides all necessary services and spare parts. To order necessary services and parts, please contact your supplier.

8.4. Maintenance checks. The following checks can be done by operator.

8.4.1. Daily maintenance

- clean the surface of the device from liquid droplets and contamination;
- perform the rinsing cycle twice using distilled water after finishing the operation (see point 5).

8.4.2. Monthly maintenance

Cleaning with 75% ethanol:

- mounting contacts on the manifold;
- mounting surface of the plate platform and plate holder spring.

8.5. Ethanol (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for cleaning and disinfection of the unit.

8.6. Filter replacement (fig.11)

It is recommended to change the hydrophobic filter once in six months; in particular cases, e.g. at intensive operation, once in three months (to order the filter, you have to know the product identification number, see the table in Specifications chapter).

Disconnect the filter from outlet tube, remove the filter, insert a new filter into the socket and tighten it.

Attention! Maintain mounting of the filter according to Fig.11. The marking "**IN**" should be located on the side of the inlet tube (facing to the bottle)!

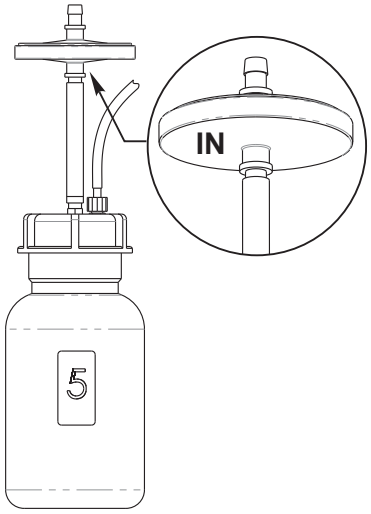


Fig. 11. Filter mount

8.7. Troubleshooting

Symptom	Possible cause	Action required
Manifold dosing error Volume of washing solution does not correspond to the set volume, dosing unevenness is observed along the plate wells or the washing solution is not dispensed at all.	1. Poor contact between the bottle hose connector and the device 2. The hose is overbend 3. Obstruction of sieve filters 4. Obstruction of dispensing channel of the manifold or a needle 5. Absence of liquid in bottles	1. Ensure proper connection of the bottle with the device or 2. Check if the hose is overbend and straighten it if necessary or 3. Check if the sieve filters in bottles No. 1, 2 and 3 are clogged. 4. Check if the dispensing channel of the manifold or needles is not obstructed. If yes, perform cleaning (see the section "Obstruction of manifold dispensing channel or a needle" in this Table); 5. Ensure presence of liquid in the bottles No. 1, 2 and 3; fill up liquid in a bottle if needed. (Attention: information on liquid levels in bottles is shown on the display).

Table 5. Troubleshooting

Symptom	Possible cause	Action required
Obstruction of manifold dispensing channel or a needle	During operation needles of the manifold can be obstructed.	1. Determine the obstructed needle by checking the underfilling of a well. **Warning!** Be careful working with the manifold, prevent pricks and injuries caused by needles, they may contain dangerous infections! 2. Take off the manifold from the device, put it down with needles upward. Clean the aspiration channel needles with the wiping-rod Ø 0,80 mm, and clean needles of the dispensing channel with the wiping-rod Ø 0,45 mm, inserting the wiping-rod against stop and removing it. 3. After cleaning, install the manifold on the device and do the rinsing procedure to ensure the proper operation of the needle. 4. In the case of repeated obstruction, execute requirements of pp. 1 and 2 of this section, unscrew the manifold's plugs, disconnect the dispensing and aspirating tubes, clean the dispensing or aspiration channel with the wiping-rod, rinse the manifold with the 75% solution of ethanol, replace the plugs, install the manifold on the device and ensure the proper operation of needles.
Washing solution is not dispensed into a plate	Deformation (wall glueing) of dosing valve tube due to the long-term storage or standstill of the device	1. Remove the tube from the valve. 2. In the case of deformation, open with fingers the closed part of the dosing valve. 3. Insert the tube into the valve opening up to position shown in Fig.2/4. Note: in order to release the tube, press the valve on the side and slightly stretch the tube pulling it through the opening.
Wear or damage of the valve tubes and the pump	The connecting tubes are worn or damaged during exploitation.	Turn off the device and have it checked by a specialist. Only service engineers and trained specialists are allowed to replace the tubes.
Volume of residual liquid in a well exceeds the admissible value (2 mkl).	1. Depth of the manifold immersion is not determined. 2. Obstruction of the manifold aspiration channel or a needle	1. Perform well depth measurement in the automatic mode. 2. Check if the aspiration channel and needles are not obstructed. If yes, do their cleaning (see the section "Obstruction of manifold dispensing channel or a needle" in this Table). If it does not help, turn off the device and have it checked by a specialist.
The manifold is not descending	Poor contact of the manifold with the holder arm	Wipe the golden contacts of the manifold and the holder arm with a piece of cotton moistened with 75% ethanol solution.
On switching on, the device does not fetch liquid from the active bottle.	Insufficient liquid quantity in the pipe	To solve this problem, the following procedure should be done: - Stop the programme. - Prepare a syringe with 5ml of distilled water. - Unscrew the hose from the active bottle. - Press a button "System Rinse". - Using buttons "+" and "-", select number of the active bottle and press the button "Start". - At the moment when the pump begins operation, gradually fill the hose with distilled water from the syringe. - Tighten the hose on the bottle. - If the pump does not restore performance, turn to the service engineer.

Table 5. Troubleshooting

9. Warranty, reclamation Information

9.1. The Manufacturer guarantees the compliance of the unit with the requirements of Specifications, provided the Customer follows the operation, storage and transportation instructions.

9.2. The warranted service life of the unit from date of delivery to the Customer is 12 months (exclude items mentioned in the table of Specifications point). Contact your local distributor to check availability of extended warranty.

9.3. If any manufacturing defects are discovered by the Customer, an unsatisfactory equipment claim shall be compiled, certified and sent to the local distributor address. Please visit www.biosan.lv, Technical support section to obtain the claim form.

9.4. The following information will be required in the event that warranty or post-warranty service comes necessary. Complete the table below and retain for your record.

Model	Inteliwasher 3D-IW8
Serial number	
Date of sale	

10. Glossary

1	Rinsing mode	plate washing mode consisting of consequent dispension and aspiration to/from wells.
2	Mixing mode	provides mixing of solution in wells by shaking the platform
3	Single point aspiration	plate washing mode which provides solution aspiration from the center point of a well.
4	Double aspiration	plate washing mode which provides solution aspiration consequently from two opposite points of a well
5	Strip washing mode	plate washing by rows
6	Dispensing	filling wells with a set solution volume
7	Waste bottle	the bottle for collecting the aspirated liquid
8	Plate setup	procedure for automatic measurement of well depth
9	Run mode	command to start the washing program
10	Enter	in program setup mode, this command is used for confirming one by one the program parameters
11	Rows	command to set the number of washable rows
12	Stop mode	command to stop the washing program

11. CE Marking

The CE marking affixed to the equipment indicates that the equipment meets the requirements of the following Directive(s):

RoHS Directive **2011/65/EU**

"RESTRICTION OF HAZARDOUS SUBSTANCES"

WEEE Directive **2002/96/EU** and **2012/19/EU**

"WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT"

EMC Directive **2004/108/EC**

"**ELECTROMAGNETIC COMPATIBILITY**"

Applied standards:

EN 61326-1	Electrical equipment for measurement, control and laboratory use EMC requirements. General requirements.

Low Voltage Directive **2006/95/EC**

"**ELECTRICAL EQUIPMENT DESIGNED FOR USE WITHIN CERTAIN VOLTAGE LIMITS**"

Applied standards:

EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements.

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